ABSTRACT

A method for forming an isolation region in a semiconductor device, in which nitrogen ions are injected into a region of an isolation oxide film to form an oxynitride film, thereby preventing formation of a recess at a top edge of the isolation oxide film, which improves the device isolation characteristic. The method includes depositing a pad oxide film and a pad nitride film over a substrate. The pad oxide film, the pad nitride film, and the substrate are selectively removed to form a trench, which is then filled with an isolation oxide film. Nitrogen ions are injected into an entire surface of the pad nitride film, inclusive of the isolation oxide film, to form an oxynitride film in a region of the isolation oxide film. The pad nitride film and the pad oxide film are removed, and a gate oxide film and a polysilicon layer are deposited.